

Upper Mississippi Inland Waterway Analysis



Iowa Freight Advisory Council

September 14, 2018

Summary

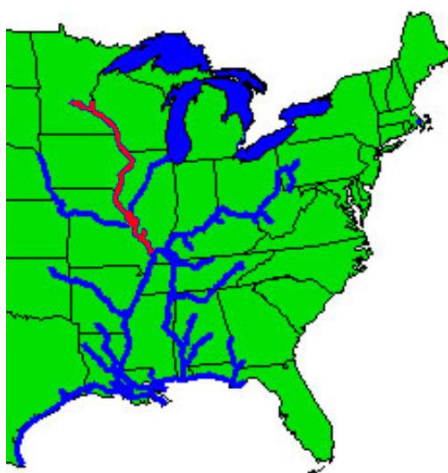


- Overview of the system
- Iowa DOT interest in the system
- Initiatives
 - 2013 Reconnaissance Study – Iowa DOT
 - Impact of Upper Mississippi River Lock and Dam Shutdowns on State Highway Infrastructure – Mid-America Freight Coalition
 - Ongoing Partnerships Study
- Next steps

Upper Mississippi Inland Waterway



- 27 Locks and Dams
 - St. Paul District: L/Ds 1 – 10 (11 sites)
 - Rock Island District: L/Ds 11 – 22 (12 sites)
 - St. Louis District: L/Ds 24 – 27 (4 sites)
- 750 miles of 9-foot navigation channel
- 1,200-foot locks at Locks 27, Mel Price & 19
- Remaining sites are 600-locks
- Primary construction in the 1930's
- Note: Illinois Waterway (8 locks and dams) is a part of the UMIW navigation system.



Iowa DOT Interest in System



- Prior to 2013: Monitor policy issues
- January 2013: Low water levels and rock pinnacles threatened navigation season
- 2013 Reconnaissance Study
 - Assessment of UMIW issues/conditions
 - Alternative approaches to funding and operation
- 2014 – Regional Collaboration
 - M-35 designation
 - TIGER Planning Grant Application

Impact of Upper Mississippi River Shutdown



- October 2017 Study from the Mid-America Freight Coalition
- Built upon several other recent studies on this topic
- Looked at impact of system shut down for Ag products moving down river
- Increased truck shipments: 367,000 to 489,000 per season
- Increased costs
 - Pavement damage: \$22 m to \$29 m
 - Trucking cost: \$212 m to \$283 m

Partnerships Study

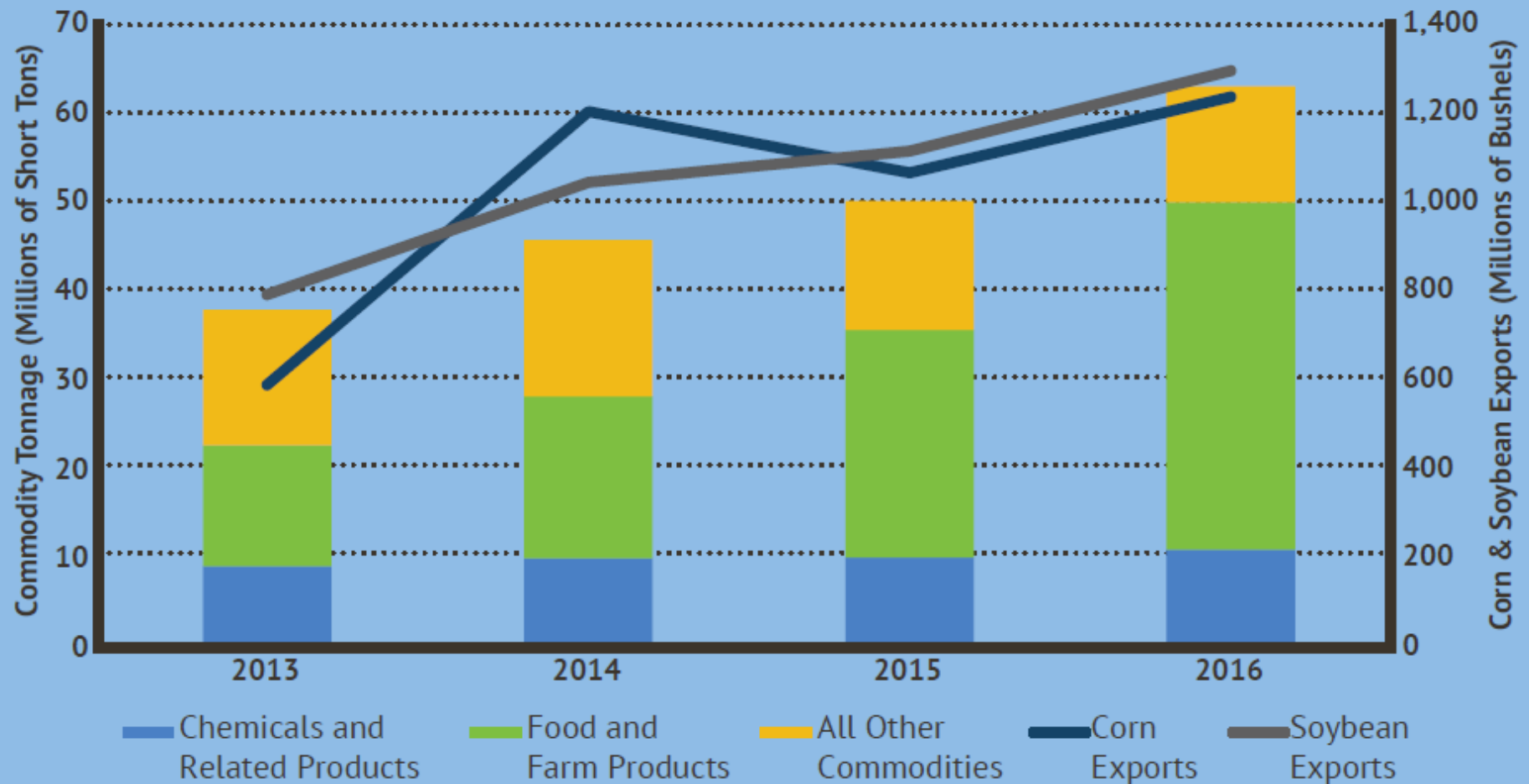


- December 2016: Identification of State Infrastructure priorities for President Transition Team
- State of Iowa: Number one priority submitted was UMIW Lock and Dam System
- Initiated Partnerships Study
 - Reassess system condition/operation
 - Identify pilot project scenarios and economic analysis
 - Governance analysis
 - Financing and delivery alternatives
 - Stakeholder outreach



MISSISSIPPI RIVER USAGE

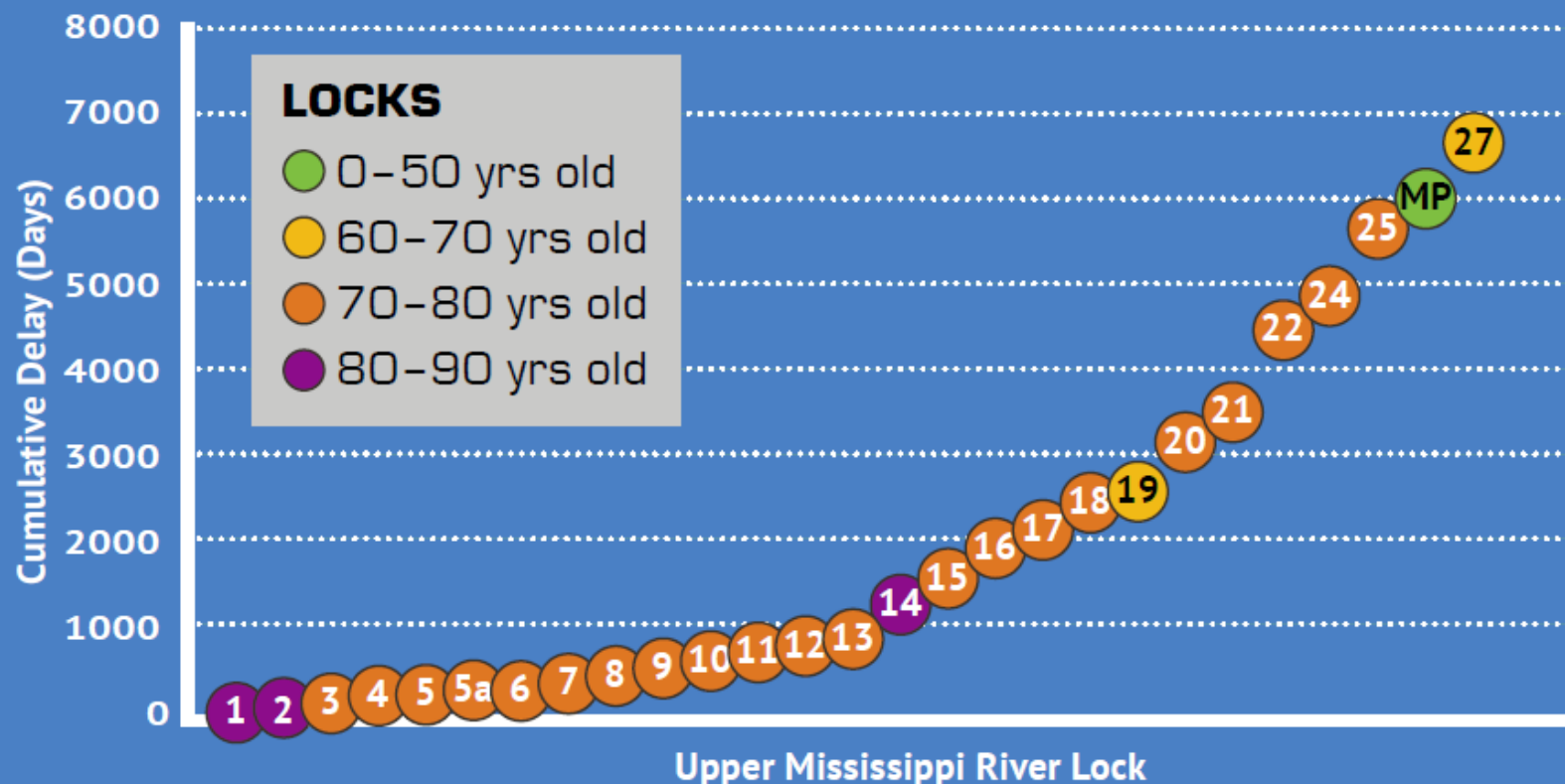
Exports and use of the Mississippi River is on the rise.





2016 CUMULATIVE LOCKAGE DELAYS

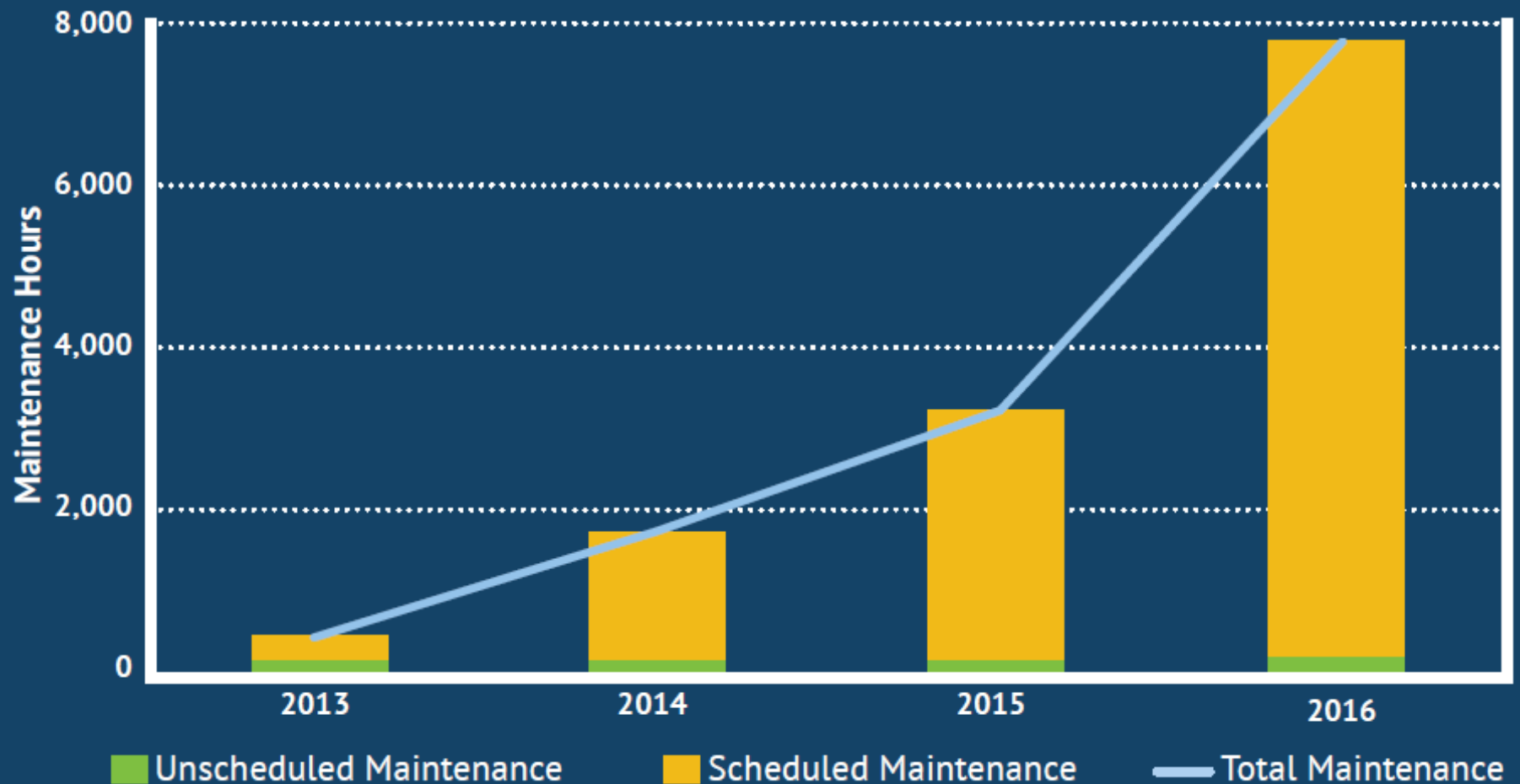
Without improvements to existing 1930s design, processing times along the Upper Mississippi River Inland Waterway will remain unchanged and lead to costly congestion and delays, totaling nearly 7,000 days per year.





LOCK OUTAGE MAINTENANCE HOURS

Old locks require increasing maintenance.



UMIW Lock 11 Miter Gates



EMERGENCY REPAIRS KEEP LOCKS OPERATIONAL FOR SPRING RUSH

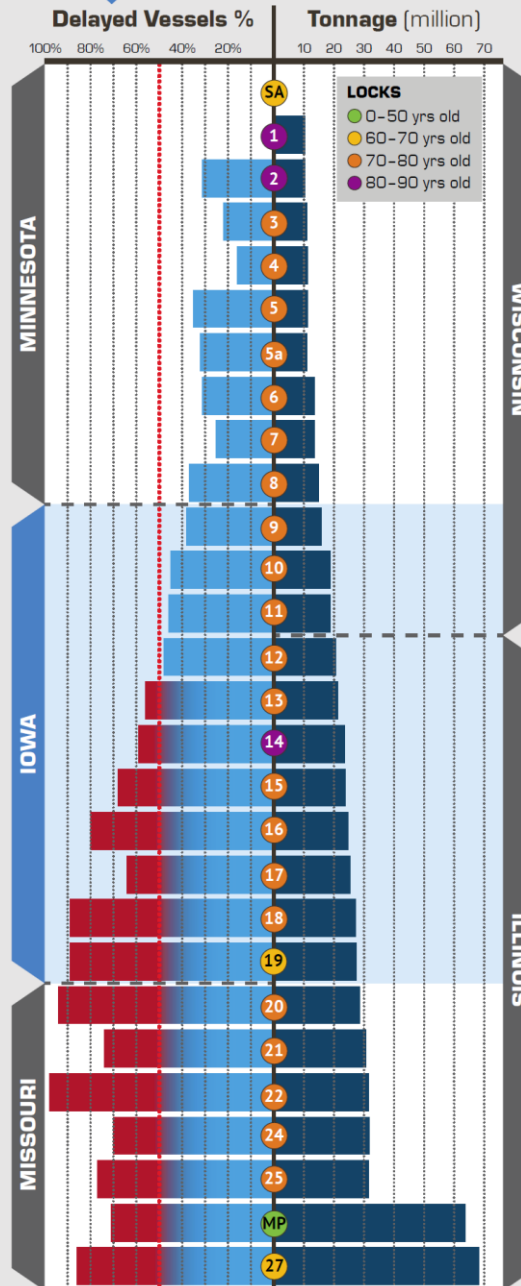


Mississippi River Project maintenance crews perform emergency repairs at Lock and Dam 11 in Dubuque, Iowa, after a crack was found in a critical piece of one of the lock's miter gates. Photo by Matt Thurman

- Emergency repairs were on the embedded miter gate anchorages.
- Cracking on one of the gate anchorages resulted in a 1-day unscheduled lock closure.
- A full failure of the gate anchorage would result in displacement of the miter gate and a multiple day lock closure.

Source: USACE – Rock Island, Tower Times, May/June 2018

UPPER MISSISSIPPI LOCKS & DAMS ANNUAL VOLUME OF TRADE VS. DELAYS



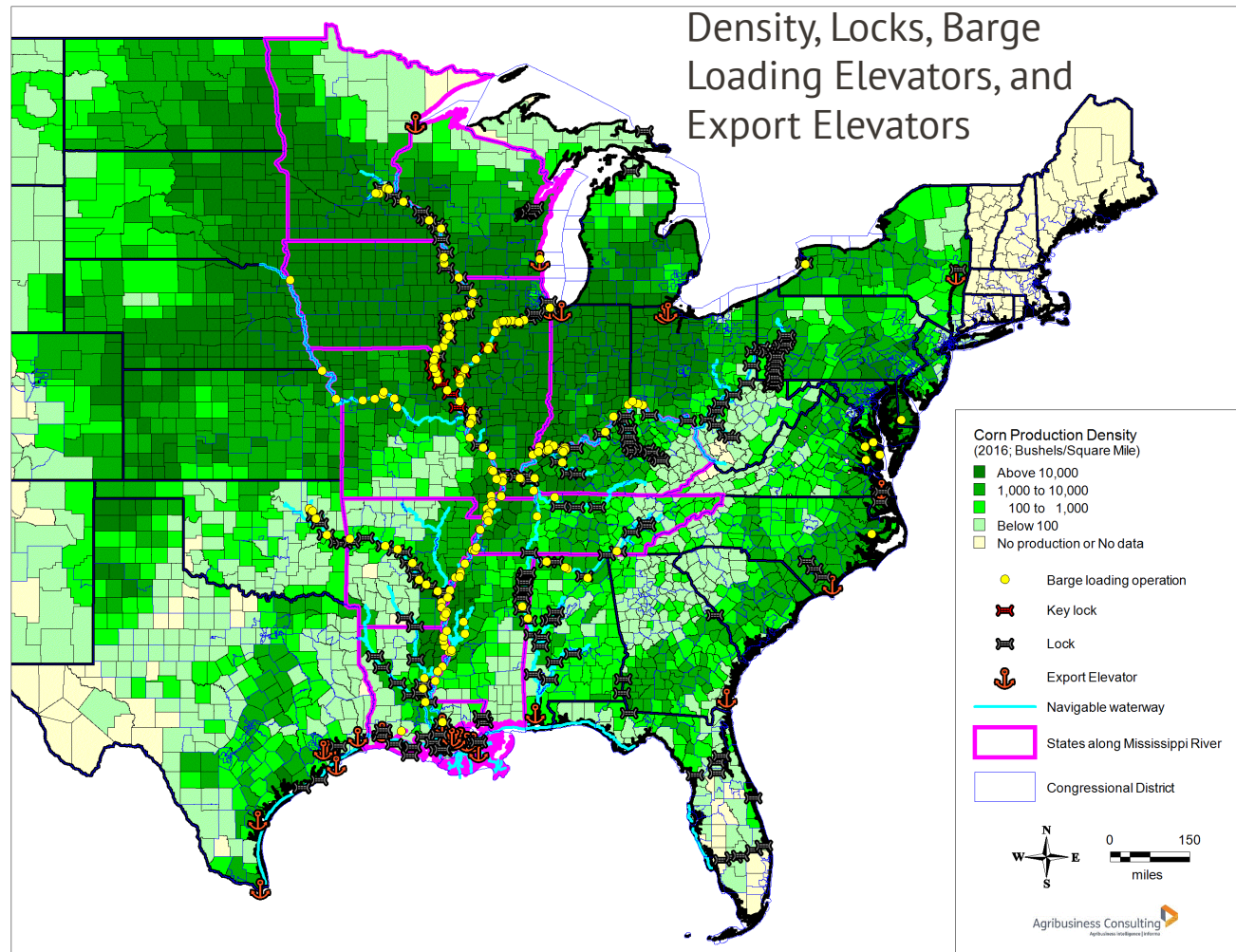
2016 calendar year USACE data

Commodity Forecast

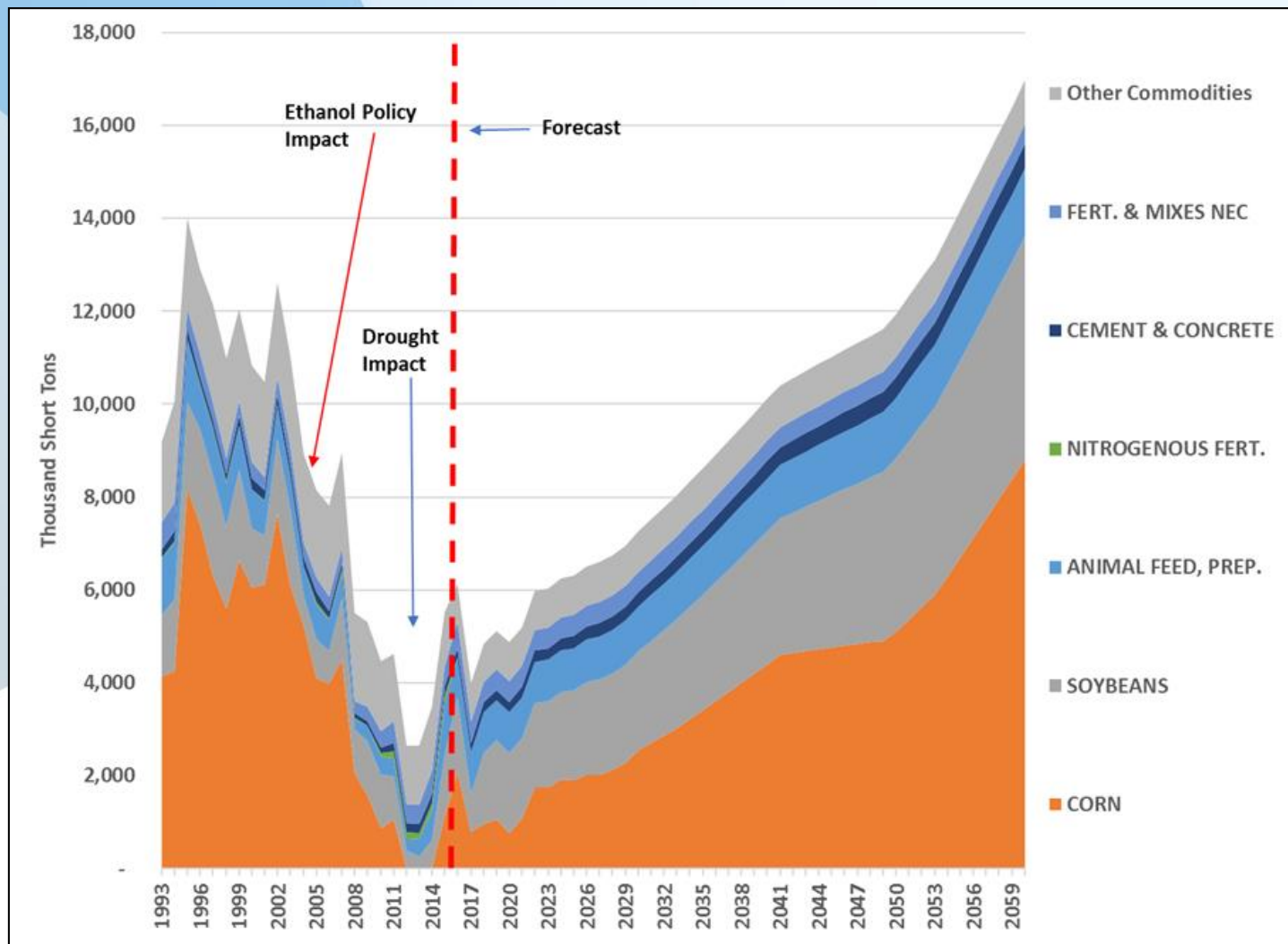


- Informa Economics IEG
 - Specialized agribusiness experience
 - Access to barge fleet profile and commodity data
- General approach:
 - Based on government data
 - Multiple geographic views (world, US, region, state)
 - Balance sheet approach (surplus/deficit)
- Also considers economic factors, modal shares, drivers of barge movement

Mississippi River System and Corn Production



Iowa Barge Commodity Flows



Upper Mississippi River Waterway – Three Pilot Project Scenarios

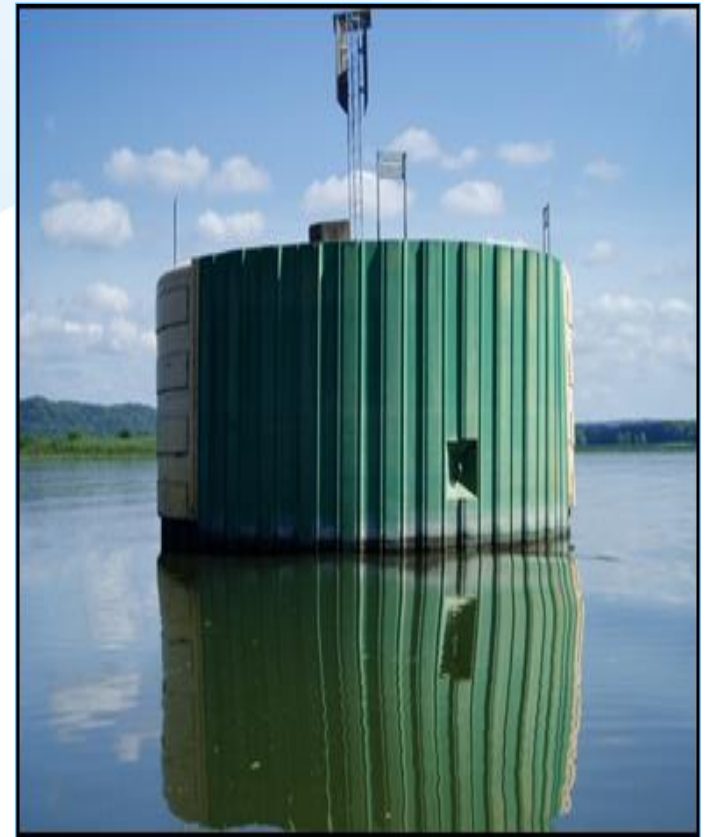


- Scenarios that upgrade or improve the efficiency, reliability and capacity of the existing system of locks and dams:
 - Efficiency - Micro Upgrade
 - Small scale stand-alone navigation efficiency improvement project that can be replicated on the UMIW Waterway.
 - Reliability - System Improvements
 - Projects that improve the long-term durability and sustainability of the existing locks and dams on the UMIW Waterway.
 - Capacity – Large Scale Upgrade
 - Major recapitalization projects the expand the ability of the existing UMIW Waterway locks to meet future traffic demands.

Pilot Project - Lock 14 Mooring Cell



- Approach time savings (maximum)
 - 55 minutes for exchange lockages
- Mean time savings (mean)
 - 20 minutes for across all exchange lockages
- Annual time savings
 - 217 hours / 9 days
 - Based upon 2016 traffic data for Lock 14
- Cost
 - \$1.9 million
- Timeline: 2 years
 - 1 year Design and Permitting
 - 1 year Construction



Source: USACE – Rock Island

Pilot Project – UMIW's Major Rehabilitation Program



- One cycle of system wide rehabilitation has occurred (1986 – 2008)
- No new major rehabilitation projects have been approved on the UMIW in the past 15 years.
- Indexing historical UMIW project costs yield an average project cost of \$45 million per site.
- Total cost: \$1.2 billion for the 27 UMIW locks and dams
 - \$600 million – Federal / \$600 million - IWTF



Pilot Project - 1,200-Foot Locks @ UMIW Locks 22, 24 and 25



- UMIW Locks 22, 24 and 25 were selected for the 3 Lock Large Scale Upgrade Scenario (*no Lock 23*)
- Cost: \$1.35 billion
- Timeline: 13 years
 - 9 years per 1,200-foot lock (4 years design, permitting & contract award + 5 years construction)
 - 2 year interval between project starts at Locks 25, 24 and 22.

Site	1,200-Foot Lock Project Cost (March 2016)	Lift (feet)	Foundation Condition
Lock & Dam 25	\$543 million	15	Sand
Lock & Dam 24	\$434 million	15	Mixed
Lock & Dam 22	\$372 million	10.5	Rock

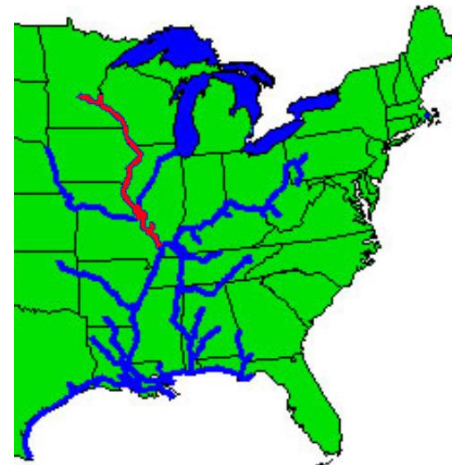
Approach to Economic Impact Analysis



- **Approach** used for baseline economic analysis:
 - Derive value-per-ton for each commodity under a baseline scenario
 - Monetize commodity forecast volumes
 - Obtain baseline IMPLAN results on an industry basis
- Analysis conducted at a **regional level** (combined, 5-state study area)
- Iowa results estimated by taking long-term average forecast of waterborne tonnage share in 5-state study area

State	Average Share
Minnesota	43.7%
Iowa	18.5%
Illinois	18.3%
Wisconsin	11.8%
Missouri	7.7%

Source: IEG Forecasts



Regional Results by Scenario (2018-2060 average year)



- Impacts for scenarios much **smaller than baseline** contributions to economy
- System-wide reliability improvements generate **largest impacts**
- Large-scale upgrades (on three locks) generate about **half the impacts** of reliability improvements
 - Low and high estimates similar, but show range of results
- Mooring cell impacts are **small** (but, so are the investments)

Benefit-Cost Analysis



- Simple calculation (differs from USACE methodology)
 - Benefits include barge operator and fuel consumption costs
 - Annual operating and maintenance (O&M) cost assumed to be 3% of capital expenditures
 - Benefits and costs estimated from 2018 to 2060 and discounted at 7%

Benefit Cost Analysis Results, Discounted at 7%

Scenario	B/C Range
Mooring Cell	3+
System Reliability Improvements	1-2
Large Scale Upgrade (Low Impact)	Near 1
Large Scale Upgrade (High Impact)	Near 1

Next steps



- Finalize report material
- Consider programming funding for mooring cell
- Continue partnering with Corps and pursuing opportunities at federal level



Questions?



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